

We claim:

1. A curable unreinforced resin composition comprising:
 - (a) at least one poly(arylene ether) polyvinyl resin having a molecular weight of between about 900 and 75,000; and
 - (b) at least one vinyl or acrylic-substituted resin.
2. The curable unreinforced resin composition of claim 1, wherein said poly(arylene ether) polyvinyl resin has an average molecular weight of less than about 10,000 g/mol.
3. The curable unreinforced resin composition of claim 2, wherein said poly(arylene ether) polyvinyl resin has a number average molecular weight of less than about 5,000 g/mol.
4. The curable unreinforced resin composition of claim 1, wherein said poly(arylene ether) polyvinyl resin has an average molecular weight of between about 20,000 and 75,000 g/mol.
5. The curable unreinforced resin composition of claim 4, wherein said poly(arylene ether) polyvinyl resin has an average molecular weight between about 30,000 to about 71,000.
6. The curable unreinforced resin composition of claim 4, which additionally comprises a catalyst.
7. The curable unreinforced resin composition of claim 4, which additionally comprises a complementary, non-reactive material being one or more of a thermoset resin, a thermoplastic resin, or an elastomeric resin.
8. The curable unreinforced resin composition of claim 7, wherein said complementary, non-reactive material is one or more of nylon, polystyrene, or polypropylene.

9. The curable unreinforced resin composition of claim 7, wherein said complementary, non-reactive material is one or more of nylon, polystyrene, or polypropylene.

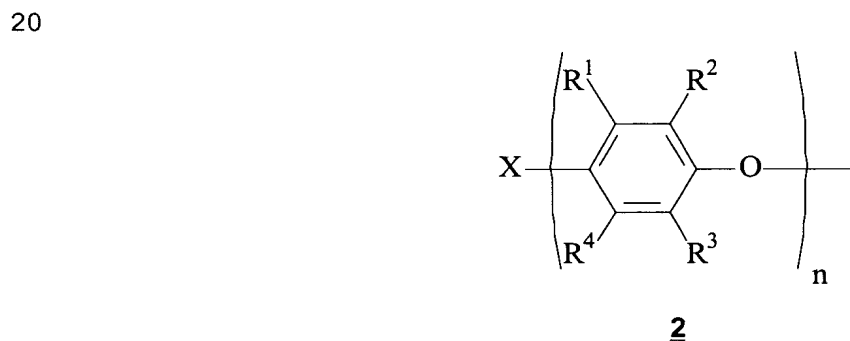
5 10. The curable unreinforced resin composition of claim 1, which further comprises one or more of catalysts, flame-retardants, organic solvents, and curing agents.

11. The curable unreinforced resin composition of claim 1, wherein said poly(arylene ether) polyvinyl resin has an average molecular weight of between about 900 and
10 10,000.

12. The curable unreinforced resin composition of claim 1, wherein said poly(arylene ether) comprises poly(phenylene ether) compounds of general structure, 1:

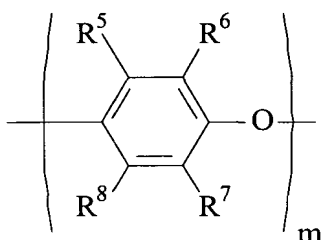


wherein Q is the residuum of a phenol and comprises radicals of the following structure, 2:

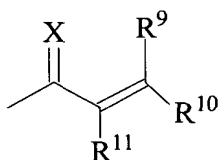


25 wherein, for structure 2, X is hydrogen, substituted or unsubstituted C₁₋₁₀₀ alkyl, aryl, and mixed alkyl-aryl hydrocarbons, or such hydrocarbon groups containing a substituent selected from the group consisting of carboxylic acid, halogen, aldehyde, alcohol, and amino radicals; X may be sulfur, sulfonyl, sulfonyl, oxygen, or other such bridging group having a valency of 2 to result in bis- or higher

polyphenols; R^{1-4} independently may be hydrogen, substituted or unsubstituted C_{1-100} alkyl, alkenyl, alkynoyl, aryl, mixed alkyl-aryl hydrocarbons, or such groups also containing a substituent selected from the group consisting of carboxylic acid, aldehyde, alcohol, halogen, and amino functionality; y and n independently range from about 1-100; and J comprises recurring units of the following structure, 3:

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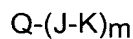
wherein, for structure 3, R^{5-8} independently may be hydrogen, alkyl, alkenyl, alkynoyl, aryl, mixed alkyl-aryl hydrocarbons, or such groups also containing a substituent selected from the group consisting of carboxylic acid, aldehyde, alcohol, and amino functionality, and m ranges from 1-200; and K has the following structure:



wherein X is O, S, or two hydrogens, and wherein R^{9-11} are independently a hydrogen or substituted or unsubstituted C_{1-100} alkyl or aryl or mixed alkyl or aryl group,

wherein any of the foregoing "R" substituents optionally may be partially or fully halogenated, and wherein, any one of the R^{5-8} substituents also may be used for the R^{1-4} groups.

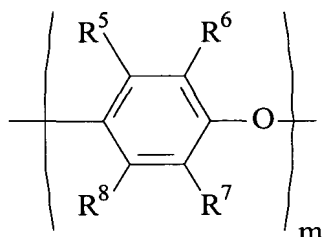
13. The curable unreinforced resin composition of claim 12, wherein said poly(phenylene ether (PPE) comprises those of the general structure, 1:



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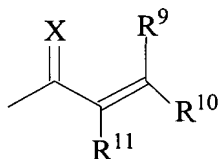
wherein Q is the residuum of a phenol;

J comprises recurring units of the following structure, 3:



3

wherein, for structure 3, R⁵⁻⁸ independently is selected from hydrogen, alkyl, alkenyl, alkynoyl, aryl, mixed alkyl-aryl hydrocarbons, wherein such groups may contain a substituent selected from carboxylic acid, aldehyde, alcohol, and amino functionality; K has the following structure:



wherein R⁹⁻¹¹ is a hydrogen or substituted or unsubstituted C₁₋₁₀₀ alkyl or aryl or mixed alkyl or aryl group; X is an oxygen, and m ranges from 1-200.

14. A curable unreinforced resin composition comprising:

- (a) at least one poly(arylene ether) polyvinyl resin having a molecular weight between about 900 and 2,900 obtained through a redistribution reaction; and
- (b) at least one vinyl or acrylic-substituted resin.

15. The curable unreinforced resin composition of claim 13, wherein said poly(arylene ether) polyvinyl resin has an average molecular weight of between about 1,200 and 7,500.
- 5 16. The curable unreinforced resin composition of claim 13, wherein said poly(arylene ether) polyvinyl resin has an average molecular weight of between about 3000 and 10,000.
- 10 17. The curable unreinforced resin composition of claim 16, which additionally comprises a complementary, non-reactive material being one or more of a thermoset resin, a thermoplastic resin, or an elastomeric resin.
- 15 18. The curable unreinforced resin composition of claim 16, wherein said poly(arylene ether) polyvinyl resin has a number average molecular weight between about 3100 to about 5500.
19. The curable unreinforced resin composition of claim 16, which further comprises one or more of catalysts, flame-retardants, organic solvents, and curing agents.
- 20 20. The curable unreinforced resin composition of claim 19, which additionally comprises a catalyst.
- 25 21. A B-stage thermoset molding composition, comprising the partially cured residue of the curable resin composition of claim 1.
22. A B-stage thermoset molding composition, comprising the partially cured residue of the curable resin composition of claim 4.
- 30 23. A B-stage thermoset molding composition, comprising the partially cured residue of the curable resin composition of claim 14.
24. A B-stage thermoset molding composition, comprising the partially cured residue of the curable resin composition of claim 16.

25. An article of manufacture, which comprises an article molded from the B-stage thermoset composition of claim 21.
- 5 26. An article of manufacture, which comprises an article molded from the thermoset composition of claim 1.
27. An article of manufacture, which comprises an article molded from the B-stage thermoset composition of claim 22.
- 10 28. An article of manufacture, which comprises an article molded from the thermoset composition of claim 4.
29. An article of manufacture, which comprises an article molded from the B-stage thermoset composition of claim 23.
- 15 30. An article of manufacture, which comprises an article molded from the thermoset composition of claim 14.
31. An article of manufacture, which comprises an article molded from the B-stage thermoset composition of claim 24.
- 20 32. An article of manufacture, which comprises an article molded from the thermoset composition of claim 16.
- 25 33. A substrate coated with an adhesive layer of the curable composition of claim 1.
34. The substrate of claim 33, wherein the adhesive layer is at least partially cured.
35. The substrate of claim 34, having a second substrate bonded thereto by said at least partially cured adhesive composition to form a laminate.
- 30 36. The substrate of claim 33, which is an electrically conductive metal.
37. The substrate of claim 36, wherein said conductive metal is copper.

38. The substrate of claim 36, which is flexible.
- 5 39. A first substrate coated with an adhesive layer of the curable composition of claim 14.
40. The first substrate of claim 39, wherein
- 10 (a) said first substrate is a thermoplastic film, which is not said resin of claim 14;
- (b) said adhesive layer is coated on one or both sides of said first substrate; and
- (c) a layer of copper is optionally laminated to said thermoplastic film by said adhesive layer.
- 15 41. A laminated article, comprising a second substrate adhesively bound with said adhesive layer to the adhesively coated first substrate of claim 39.
42. A flexible article, comprising two flexible substrates laminated together with said curable composition of claim 1.
- 20 43. A laminate, comprising three or more substrates having the at least partially cured adhesive curable composition of claim 34 disposed between each adjacent substrate.
- 25 44. The laminate of claim 43, wherein said curable composition is fully cured.
45. The laminate of claim 43, wherein said substrates are formed from a conductive metal.
- 30 46. The laminate of claim 44, wherein said substrates are copper.
47. The laminate of claim 44 formed from flexible substrates, wherein said curable composition is cured and the laminate is flexible.

48. The laminate of claim 47, wherein said curable composition was cured by one or more of heat, ultraviolet light, or electron beam.
49. A flexible laminate, comprising two or more flexible substrates, wherein said laminates are bonded together with the curable composition of claim 14.
50. A cured film of the curable unreinforced resin composition of claim 48.
51. The cured film of claim 50, which is bonded to a substrate.
52. The cured film of claim 50, which has a metalized film deposited thereon, said metal being one or more of zirconium, zirconium nitride, titanium, titanium nitride, zirconium carbonitride, chromium, chromium nitride, nickel, nickel nitride, titanium carbonitride, gold, silver, carbon nitride, aluminum, or molybdenum.
53. The cured film of claim 52, wherein the metal comprises copper.
54. The cured film of claim 53, wherein said copper was deposited on only one side of said cured film.
55. The cured film of claim 53, wherein said copper was deposited on both side of said cured film.
56. A film of the curable unreinforced resin composition of claim 6, which has had a metalized film deposited thereon.
57. A laminate, comprising adhesively coated substrate of claim 32 bound to the cured film of claim 53.
58. The cured residue of the curable unreinforced resin composition of claim 20.
59. The cured residue of claim 58, which was cured by one or more of by heat, ultraviolet light, or electron beam.

60. The cured residue of claim 59, which had a metal layer applied to at least one side thereof prior to said curing.
61. The cured residue of claim 60, wherein said metal layer was applied by vapor deposition of a metal being one or more of zirconium, zirconium nitride, titanium, titanium nitride, zirconium carbonitride, chromium, chromium nitride, nickel, nickel nitride, titanium carbonitride, gold, silver, carbon nitride, aluminum, or molybdenum.
62. The cured residue of claim 60, wherein said metal comprises copper.
63. The cured residue of claim 62, wherein said copper is present is on only one side.
64. The cured residue of claim 62, wherein said copper is present is on both sides.
65. An article comprising, a film of the cured residue of claim 61 having a layer of the composition of claim 1 applied on said film.
66. An article comprises, a film of the cured residue of claim 61 having a layer of the composition of claim 1 applied on both sides of said film.
67. An article comprising, a film of the cured residue of claim 62 having layer of the composition of claim 1 applied thereon.
68. An article comprising, the adhesively coated substrate of claim 34 bound to the cured residue of claim 60.
69. An article comprising, a dissimilar thermoplastic film having a layer of copper on one side, both sides, or no side, said dissimilar thermoplastic film being bound to the adhesively coated substrate of claim 34.
70. The catalyzed film of claim 50, which additionally comprises an anti-solvent component in the curable unreinforced resin composition.
71. The catalyzed film of claim 50 adhered to a release agent film.

72. The catalyzed film of claim 58, which additionally comprises an anti-solvent component in the curable unreinforced resin composition.
- 5 73. The catalyzed film of claim 58 adhered to a release agent film.